

vation of the neighbours of W.B. 7h. 1029. It may be ultimately found that Schmidt's star affords an extreme illustration of the laws affecting variables of the class of U Geminorum.

Can Mr. Baxendell put anything upon record as to dates when he has examined the vicinity, which may bear upon the length of invisibility of Schmidt's star?

THE COMETS OF 1810 AND 1863 (v).—At the suggestion of Prof. Bruhns new elements of the Comet of 1810 have been investigated by Herr Thraen from the ten observations made at Marseilles by Pons, who discovered the comet on August 22. We had previously orbits by Bessel and Triesnecker. The observations are unfortunately affected with considerable errors, but the following appears to be the best system of elements obtainable from them:—

Perihelion passage, 1810, October 6^h 23^m 79^s, M.T. at Greenwich.

Longitude of perihelion		63° 46' 43"	M. Eq.
Ascending node		308° 50' 31"	1810° 0
Inclination		62° 55' 39"	
Log. perihelion distance		9.986603	

Motion—direct.

We subjoin Prof. Weiss's parabolic elements of the Comet 1863 (v), discovered by Respighi at Bologna on December 28; notwithstanding their striking resemblance to those of the comet of 1810, Prof. Weiss was inclined to consider the comets different: he tried an ellipse with period of fifty-three years, but the comparison of the observations in January, 1864, was not so satisfactory as with the parabola. Michez, by direct calculation upon a month's observations, obtained a period of 109 years.

Perihelion passage, 1863, Dec. 27^h 76^m 36^s, M.T. at Greenwich.

Longitude of perihelion		60° 24' 28"	M. Eq.
Ascending node		304° 43' 26"	1864° 0
Inclination		64° 28' 46"	
Log. perihelion distance		9.887344	

Motion—direct.

There is perhaps room for a further and more minute discussion of the observations of 1863-64, though the result may be adverse to the idea at one time entertained that the comets are identical. There was a near approach to the Earth at the end of January, 1864 (0° 18'), and the perturbations from this cause will require to be taken into account in a more refined determination of the orbit. The comet was observed at Kremsmünster till February 14; Prof. Julius Schmidt sought for it ineffectually at Athens on March 4.

Probably we have, in the case of these comets, an illustration that mere similarity of orbits, even though it may be pretty close, is not to be regarded as proof of identity.

CHEMICAL NOTES

HERR DRECHSEL claims (*Journal Pract. Chem.*) to have converted ammonium carbonate into urea by the continued action of a galvanic current, the direction of which is rapidly reversed by a self-acting commutator.

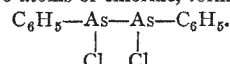
A MODIFICATION in the process for manufacturing iodine from seaweed is described by MM. Pellieux and Allary (*Bull. Soc. Chim.*), whereby, it is said, nine times more iodine is obtained than by the older process. The unburnt seaweeds are allowed to ferment in large heaps; the liquor which drains off is concentrated and dialysed in Dubrunfaut's apparatus before evaporation. The plants are burnt without further drying.

SEVERAL of the tinned preparations of the St. Louis Canning Company have been examined by Mr. Wigner (*Analyst*). The dietetic value of the corned beef is about twice that of boneless fresh beef; the cooked ox-tongues contain less salt and more nutritive matter than ordinary dried tongues. *Succotash*, an American preparation of haricot beans, Lima beans, and maize, cooked in the tin, with addition of a little fat, is recommended as a good specimen of boiled vegetable food.

THE number 197.2 is generally accepted as the atomic weight of platinum; Herr Seubert has very recently shown, in the *Berichte* of the German Chemical Society, that this number is very probably too high. As the mean of thirty-nine closely-agreeing results, Herr Seubert obtains the number 194.46. If this number is accepted the atomic weight of platinum is less than that of gold.

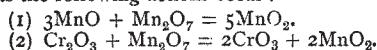
HERR TH. WILM has studied (*Berliner Berichte*) the action of finely-divided palladium, platinum, and rhodium, when heated in a stream of coal-gas. He finds that these metals decompose the gas, that when palladium is used a deposit of carbon takes place at some distance from the heated metals; that with platinum the carbon is deposited on the metal, but that on heating in a stream of air the carbon is burnt completely away, and the metal remains in its original form; with rhodium, however, the carbon appears to form a compound, the volume of which is considerably greater than that of the metal itself; this compound is decomposed only with difficulty, leaving metallic rhodium in a much more bulky form than that which it possessed before the experiment.

MICHAELIS AND SCHULTE describe, in *Berliner Berichte*, a new derivative of benzene, analogous with azobenzene, but containing arsenic in place of nitrogen. *Arsenobenzene*, $C_6H_5-As=As-C_6H_5$, produced by the action of reducing agents on $C_6H_5AsO_3$, forms slightly yellow coloured needles which are insoluble in alcohol and ether, and crystallise well from hot xylene. The new compound, unlike azobenzene, readily takes up two atoms of chlorine, forming—



DR. A. R. LEEDS describes, in the same journal, the action of nascent oxygen, ozone, and hydrogen peroxide on benzene. Nascent oxygen was produced by the action of moist phosphorus on air in presence of benzene; if the action proceeds in sunlight a large quantity of phenol is produced, together with oxalic acid; but if in diffused daylight no phenol is formed. Phenol was also produced by the direct action of hydrogen peroxide on benzene, but when ozone acted on the same hydrocarbon, carbon dioxide, acetic, formic, and oxalic acids were produced, but no phenol was formed.

In a preliminary note in the *Berliner Berichte*, Herr Donath states that the ordinary method of volumetric determination of oxidisable substances by titration with potassium permanganate in presence of acid may, in many cases, be advantageously replaced by an inverse process in which a neutral solution of the substance to be oxidised is added to a strongly alkaline solution of permanganate, whereby oxidation occurs with precipitation of manganese dioxide:—thus with manganese salts and with chromic salts the following actions occur:—



A METHOD for determining molybdenum in molybdates is described by Danesi (in *Atti della Accademia*), based upon the fact that hydriodic acid is decomposed by molybdenum trioxide with separation of iodine. A weighed quantity of the molybdate under analysis is mixed with hydrochloric acid and a solution of potassium iodide; the amount of iodine liberated in the reaction is determined by titration with sodium thiosulphate solution. The results are very accurate.

IN the same journal a method for determining nitrites and nitrates in the same solution is described by Piccini: the method is based on the decomposition of ferrous chloride by nitrous and nitric acids with evolution of nitric oxide, and on the greater readiness with which this decomposition is accomplished by nitrous than by nitric acid.

HERR M. GRÖGER has prepared (*Wien. Akad. Ber.*) several sulphochromites, i.e. salts of a chromous acid in which oxygen is replaced by sulphur; the following salts are mentioned among others:—



THERE are about 300 known optically active carbon compounds. The specific rotatory power of but seven of these has been accurately determined for the pure substance, and for solutions of the substance in various solvents in all possible degrees of dilution; these seven are tartaric acid and ethyl tartrate, cane-sugar, dextrose, terpene from turpentine oil, nicotine, and camphor. The nature and quantity of the solvent employed exerts a marked influence on the rotatory power of the active compound; as a contribution to this subject the measurements made by Herr A. Becker (*Deut. Chem. Ges. Berichte*) of the rotatory power of asparagine and aspartic acid deserve mention. An aqueous solution of either compound exhibits left-handed rotatory powers;

addition of hydrochloric or sulphuric acid diminishes the lævotatory action, and eventually converts it into a marked dextro-rotatory one; addition of acetic acid has a similar, but much less marked effect; with asparagine a point is reached at which the solution, in acetic acid, is optically inactive.

ATTENTION was recently drawn in these "Notes" to an attempt made by Th. Thomsen to show that the numbers expressing the specific rotatory powers of various carbon compounds might be expressed as whole multiples of certain fundamental constants; each of these constants was supposed to be characteristic of a group of allied compounds. Thomsen's methods of calculation have been severely criticised by Landolt (in the *Berichte*), who has shown that from the limited accurate data at our disposal such an attempt as that of Thomsen can only be regarded as a play on numbers, and is devoid of all scientific value.

EXPERIMENTS are described in the May number of the *Journal of the Chemical Society* by Jones and Taylor, which appear to leave little doubt that these chemists have succeeded in preparing a gaseous hydride of boron, and that the probable formula of this compound is BH_3 . The new compound—the existence of which establishes another point of analogy between boron and the nitrogen elements—is prepared by decomposing magnesium boride by a dilute acid; the gas has only been obtained largely mixed with hydrogen; it burns with a green flame, and is decomposed by heat with deposition of boron.

In the course of a paper on the appearance of nitrous acid during the evaporation of water (*Chem. Soc. Journal*), by Warrington, experiments on the detection of this acid, by the use of hydrochloric acid and naphthylamine hydrochloride, are described, which show that one part of nitrous acid is easily detected in 10,000,000 parts of water, and that as small a quantity as one part in 1,000,000,000 can be detected.

In the *Zeitschrift für anal. Chem.* Herr Seelheim describes experiments on the percolation of waters through soils, from which he draws the following general conclusions:—Only that stratum of any soil which is composed of the smallest particles need be considered in determining the permeability by water of the soil of a district. The composition of a soil must be ascertained, otherwise experiments on a large scale furnish no measure of the permeability of that soil. The thickest stratum of sand allows the passage of many hundred times more water than a layer of clay only one centimetre thick. The permeability of dykes may be regulated by inserting layers of clay between layers of sand.

SMALL quantities of carbon monoxide may be detected, e.g. in the air of rooms, by drawing the suspected gas over powdered glass moistened with diluted blood, shaking the blood with a drop of ammonium sulphide and examining by the spectroscope. Strips of paper soaked in a solution of 0.2 gram. palladium chloride in 100 c.c. water serve to detect carbon monoxide: the dried slips are suspended by platinum wires in a large flask with a very little water, and the flask is corked; with five parts of carbon monoxide in the atmosphere of the flask, a black shining deposit of metallic palladium appears on the paper in a few minutes; with one part, in two to four hours; and with 0.5 part, in from twelve to twenty-four hours.

A USEFUL historical account of the investigations made on the subject of dephosphorising pig-iron, appears in *Dingler's polytechnisches Journal*, and in abstract in the May number of the *Journal of the Chemical Society*.

THE rate of chemical reactions having been lately the subject of several investigations and discussions, M. Kayander publishes in the *Russian Journal of the Chemical and Physical Society* (vol. xiii. fascicule 4), the results of his last measurements. Without seeking to establish theories as to a connection between chemical affinity and the rate of reactions, M. Kayander simply tries to make measurements in a branch of chemistry insufficiently worked until now. To simplify the results he has employed a solid body and a liquid one, and has measured the rate of dissolution of magnesium in various acids; the magnesium was taken in the shape of small plates, having a surface of about 2000 square millimetres; the acids, in solutions of 0.01 of the atomic weight (in grammes) in a litre of water. Experiments as to the influence of various degrees of concentration will be published in a second paper. As to the influence of time, he arrives at the conclusion that the reaction begins at the very moment of the immersion of the magnesium in the

acid; acids when mixed produce the same action as if taken separately. As to temperature, its influence is precisely that which it exercises on the diminution of the internal friction of the particles of the liquid against one another, and does not seem to influence the chemical properties of the reacting bodies; the figures M. Kayander has arrived at from a long series of measurements establish that the speed of the reaction is inversely proportional to the internal friction of the medium. The researches will be continued.

PHYSICAL NOTES

ON heating a plate of boracite lately Herr Klein (*Gött. Soc. of Sci.*) was surprised to observe a complete change of the optical image. The boundary lines of the optical fields prove variable with temperature, and often wholly disappear, perhaps reappearing in quite different places. Herr Klein concludes from these and previous observations that boracite does not owe its origin to a twin-like formation of parts of lower symmetry, but is regular, and produces simple individuals; and the optical properties, apparently in sharp contradiction to this, are really due to tensions produced in growth. These divide the crystal into parts of different tension, of which the sometimes stronger suppress the weaker, for certain temperatures and positions of the crystal. (Similar properties in crystals of analcime have been described by Herr Ben Saude to the Göttingen Society.)

AN ingenious, somewhat complex, apparatus, named an *automatic manometer*, or automatic analyser of fire damp, has been recently brought before the Geneva Physical Society by Prof. Monnier (*Arch. des Sci.*, April 15). The fire-damp, in presence of air in excess, is decomposed in a glass vessel by a platinum wire rendered incandescent, and the condensation produced acts directly on a mercury manometer, having platinum wires inserted in its tube. The air of the mine is automatically forced by bellows, every hour and half hour, into the burner. The receiving apparatus stands in the central office. The system includes several electro-magnets, two batteries, pendulums with escapement, an alarm-bell, &c.

THE influence of pressure on the electric conductivity of metal wires has been studied anew by M. Chwolson (*Imp. Acad. of St. Petersburg Bull.*, March); Wartmann's previous experiments, in which wires were compressed between steel plates with caoutchouc lining, having failed to show whether pressure changes the specific resistance. M. Chwolson used a piezometer, giving pressures up to 60 atmospheres, the wire being wound round a glass tube, then passed through it, and the tube inserted in another, which was connected with the piezometer. (The two wire ends were brought out through binding screws.) Among other results, at 3.8 C. the copper wire showed a relative diminution of resistance of about 0.0000013 by one atmosphere of pressure; a hard brass wire about 0.0000011; and a lead wire (at 7° C.) about 0.000011, or ten times more than the brass. Pressing at 17° C. the calorific action preponderates over the direct action of pressure for copper and brass, while the reverse occurs with lead. Moreover, the author proves, in the case of the brass wire, that the pressure causes change of the specific resistance besides change of the resistance through change of the length and thickness. Every relative change of volume involves a relative change of the specific resistance about 3.6 times as great.

M. MASCART showed recently how the phenomenon of Talbot's fringes could be applied to measuring the refractive indices of gases and the difference between the refractive index of a solid and that of a liquid. M. Hurion has further thus measured the difference of the refractive indices of liquids, and in the *Journal de Physique* for April he shows how the refractive index of a liquid may with those fringes be directly determined. The two interferent rays are rendered vertical, so as each to traverse one of the halves of a partitioned rectangular vessel with glass bottom. The liquid being first at the same level in both divisions, its level in one is gradually lowered by a special contrivance, and this has the effect of displacing the fringes in the field of the telescope. Let e be the variation of level, f the number of fringes that have passed a point in the field corresponding to light of wave-length λ , then $e(m-1) = f\lambda$. The letter m represents the refractive index of the liquid for light of wave-length λ . (For further details we refer to M. Hurion's note.)